



CORAL **Conservation, Awareness** **Rehabilitation & Enrichment** **PROGRAMME**

(Coral CARE Programme)



Department of Fisheries
Ministry of Industry and
Primary Resources
Brunei Darussalam

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FOREWORD

**Assalamualaikum Warahmatullahi Wabarakatuh
Bismillahir Rahmanir Rahim**



In pursuing sustainable development, the Government of His Majesty the Sultan and Yang Di-Pertuan of Brunei Darussalam acknowledges the importance of safeguarding the marine and coastal resources which provide valuable resources and services to support human populations, enhance global food security and contribute towards poverty reduction.

Our country has a small Exclusive Economic Zone with about 50 sq km of coral cover supports a rich system of marine biodiversity and shelter 410 coral species and a great reef fish diversity of 711 species. However, their beauty could be marred by their fragility and susceptibility to damaging threats. As such we have the responsibility to implement effective outreach programme to inform and educate the public about the value of coral reef ecosystems. We have to reverse these threats if we wish to maintain the value of these resources to our country.

This booklet on **“Coral CONSERVATION, AWARENESS, REHABILITATION and ENRICHMENT Programme”** or **“Coral CARE Programme”**, provides an outline management and conservation initiatives in relation to coral reefs being undertaken by the Department of Fisheries, Ministry of Industry and Primary Resources. It also provides up-to-date perspective of coral reefs, the ecological functions and economic value of coral ecosystems of our country and the region.

I sincerely hope that this booklet stimulates interest among educators, students and reef enthusiasts to discover more about this diverse ecosystem. This booklet also aims to enable people to be more conscious about the important role of the marine environment and encourage people to actively participate in promoting the Coral CARE Programme.

I therefore take this opportunity to extend warm congratulations to the Department of Fisheries and others who have contributed to this valuable initiative in order to save our coral reefs to secure our food for the future.

**PEHIN ORANG KAYA SERI UTAMA DATO SERI SETIA
AWANG HAJI YAHYA BIN BEGAWAN MUDIM DATO PADUKA HAJI BAKAR
Minister of Industry and Primary Resources
Brunei Darussalam**

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BACKGROUND

Why Are Coral Reefs Important?

Coral reefs contain staggering biodiversity

- Coral reefs may be the most diverse ecosystem on earth; they likely at least rival terrestrial rainforests.
- Biodiversity ensures that some life will continue to survive, even after major catastrophic events that wipe out many species. Biodiverse ecosystems like reefs also provide nursery habitat to edible fish species, which would be difficult and expensive to reproduce artificially.
- 32 out of the 34 recognised animal phyla are found on coral reefs compared to 9 phyla in tropical rainforests.
- Occupying less than one quarter of 1% of the marine environment, coral reefs are home to more than 25% of all known marine fish species.
- Southeast Asia is considered the global epicentre of marine diversity. Its 100,000km² of coral reefs (34% of the world's total) are home to over 600 of the 800 reef-building coral species in the world.
- Indonesia and the Philippines hold 77% of Southeast Asia's coral reefs and nearly 80% of threatened reefs.
- About 410 reef-building coral species is known to occur in the waters of Brunei Darussalam and hosts to about 711 species of fishes.

Coral reefs provide food to millions of humans

- Corals, like trees, provide three-dimensional structure and substrate to house and feed fish and other marine animals that humans eat.
- Some estimates say that over 1 billion people depend on food from coral reefs, and reefs as a whole might be worth around \$172 billion for every year they continue to provide essential services to humans, like food.
- Coral reefs provide a source of food and shelter for a large variety of species including fish, shellfish, fungi, sponges, sea anemones, sea urchins, sea snakes, sea stars, worms, jellyfish, turtles, and snails.
- Counting only the economic value of fisheries, tourism, and shoreline protection, the costs of destroying 1km of coral reef ranges between US\$137,000-US\$1,200,000 over a 25-year period (World Resources Institute (WRI)).
- Properly managed coral reefs can yield an average of 15 tonnes of fish and other seafood per square kilometre each year (WRI). Brunei Darussalam coral reef fisheries has a potential yield of about 750 metric tonnes of fish per year in its coral reef areas (~50 km²).
- Southeast Asia's coral reef fisheries alone are estimated to yield US\$ 2.4 billion annually.
- More than 80% of the world's shallow reefs are severely over-fished.
- More than 450 million people live within 60 kilometres of coral reefs, with the majority directly or indirectly deriving food and income from them (Seaweb).

Coral reefs make important contributions to local economies

- Coral reefs attract millions of tourists every year to enjoy beaches, water sports, fishing activities and other activities.
- The total economic value of Indonesia's reefs is estimated at US\$1.6 billion annually (reef area ~ 50,020 km²).
- The total economic value of Philippine reefs is estimated at US\$1.1 billion annually (reef area ~ 26,000 km²).
- Brunei Darussalam has a potential total economic value of its reef by about B\$6.0 million annually (reef area ~ 50 km²).

Coral reefs protect and create land

- Coral reefs protect coastlines from ocean storms and floods.
- Coral reefs can dissipate wave energy from storms and tsunamis, reducing damage on adjacent land.
- Atoll islands continue to exist above the ocean's surface long after the volcanic island upon which they first grew has cooled and sunk below the waves, due exclusively to the growth of corals and other reef-associated organisms like large foraminifera.

Coral reefs supply natural medicines

- Coral reefs are important sources of new medicines that can be used to treat diseases and other health problems.
- Compounds effective against disease-causing agents like bacteria and fungi already exist in nature and being developed into effective drugs for humans if they can be isolated.
- Coral reefs are a likely place to find these natural products, due to their tremendous biodiversity.

Coral reefs are environmental indicators of water quality

- Coral reefs can only tolerate narrow ranges of temperature, salinity, water clarity, and other water conditions.

Coral reefs are beautiful and intrinsically full of wonder

- Nothing much compares to diving below the surface of clear turquoise water and seeing a natural wonderland more intricate and complex than you could possibly dream up.

What is the status of coral reefs worldwide right now?

- Corals reefs are in decline globally.
- The combination of heavy **fishing pressure, coastal development, pollution, and climate change** are degrading reefs at a rapid pace.
- We have already lost about 27 percent of coral reefs worldwide with another 15 percent in critical condition.
- If present rates of destruction are allowed to continue, 60% of the world's coral reefs will be destroyed over the next 30 years (Cesar, Degradation report).
- More than 80% of the world's shallow reefs are severely over-fished.
- 58% of the world's coral reefs are potentially threatened by human activity (WRI Reefs at Risk).
- Coral reefs are found in 109 countries; significant reef degradation has occurred in 93 (Seaweb).
- From 1876-1979 only three bleaching events were recorded, whereas 60 are on record from 1980 until 1993 (Glynn, P.W. 1993. Coral reef bleaching: ecological perspectives. Coral Reefs 12:1-17); in 2002 more than 400 events were recorded (Reef education (Australia), UNEP).
- In Brunei Darussalam, the cover of living hard corals averaged 37%, ranging from 10 to 70%. The overall ratio of live : dead cover for hard corals was strongly positive, at 6 : 1, indicative of reefs that is still in good condition in terms of their coral cover.



What are the biggest threats facing coral reefs right now?

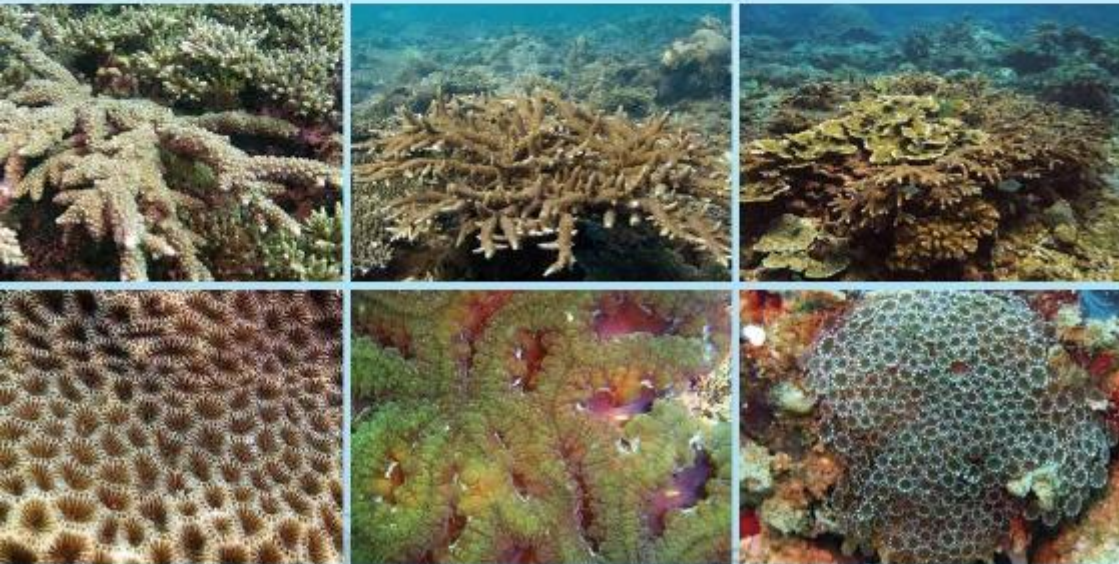
- The biggest threats are **overfishing, coastal development, pollution, and climate change**, not only to the coral reefs ecosystem but also to food security of the country.
- The World Coral Reef Conference (WCRC) in Manado, Indonesia last 14-17 May 2014, confirmed that the coral reef ecosystem has experienced serious level of degradation due to several factors among others **sedimentation, overfishing, acidification and climate change**. Participants have expressed their concerned over the future of coral reef.
- The biggest effect of climate change on coral reefs is the warming of the oceans.
- During summers, coral reefs are at risk for bleaching where they lose their colours, especially if the heat wave lasts for an extended period or is particularly warm.
- Overfishing would affect the coral reef ecosystem equilibrium.
- The damage to the coral reefs would affect its protection functions from erosion, storms and surge water as well as the stability of mangroves and seagrass beds.
- Coastal development as well as pollution on land would increase the sedimentation on the coral reefs, and thus severely affect their productivity.
- The damage to coral reefs not only affects the food security of the country, but also to its tourism business.



WHAT IS CORAL CARE PROGRAMME?

- **Representing four major pillars to care the coral**
 - **Conservation** - Refers to the protecting of the existing coral reefs and the marine life that depends on it;
 - **Awareness** - Refers to the state of public in knowing / having common knowledge about the coral;
 - **Rehabilitation** - Refers to the restoration of damaged coral and collective efforts for returning ecosystems to their original condition; and
 - **Enrichment** - Refers to dynamic process for enhancing coral communities.

This Coral CARE Programme is an initiative to support and complement the works and programmes of the Department of Fisheries of the Ministry of Industry and Primary Resources in the conservation, protection, rehabilitation and replanting of degraded / damaged coral reefs.



OBJECTIVES OF CORAL CARE PROGRAMME

- To conserve and protect our natural reefs generally to enhance food security and sustainable development of the fisheries that depends on it;
- To create awareness to the public and relevant stakeholders, the importance and role of coral reefs ecosystems;
- To promote proper management of the reefs through the establishment of Marine Protected Area (MPA) and refugia; and
- To preserve and protect coral reefs biodiversity and enhance reef health and ecosystem.

SCOPE OF ACTIVITIES AND INITIATIVES

1. CORAL CONSERVATION AND PROTECTION

- Establishment and support to Marine Protected Area (MPA) and refugia and promote its importance;
- Coordinate with other relevant institutions and stakeholders in the protection and conservation of coral reefs;
- Cleaning the coral from derelict fishing gears and the crown of thorns (CoT) menace; and
- Promote dos and don'ts to the coral reefs.

2. CORAL AWARENESS AND CAPACITY BUILDING PROGRAMME

- Conduct Reef Check Programme;
- Initiate Coral Propagation Programme;
- Include the Programme as part of School Curriculum;
- Involve other government and non-governmental institutions and organisations (NGOs); and
- Conduct road shows to reach more people for more volunteers.

3. CORAL REHABILITATION AND PROPAGATION

- Developing the coral farming that can make large scale coral reefs rehabilitation;
- Coral reef propagation and replanting;
- Incorporation of replanting of coral in all public projects involving drilling and other project that disturbed the coral area; and
- Adopting the propagated and/or replanted coral (at least 5 square meters) by individuals or institutions.

4. CORAL ENRICHMENT AND OTHER ACTIVITIES AND INITIATIVES RELATED TO THE IMPROVEMENT AND ENHANCEMENT OF THE OCEAN HEALTH AND ECOSYSTEM INCLUDING THE PROTECTION OF ITS BIODIVERSITY.

- Build more artificial reefs to increase the coral cover and fish population;
- Coral transplant to accelerate the damaged reef's natural recovery rate; and
- Conduct Research and Development on pollution, coral spawning, invasive alien species, climate change etc.

WHAT CAN YOU DO?

- Become a partner who cares about the coral reefs protection and conservation.
- Become a partner who cares to help save coral reefs and the fish, animals, and plants that depends on them.
- Advocate and encourage others to get involved and share our excitement in promoting the conservation efforts.
- Actively involved in sharing ideas with others in "Coral CARE Programme".
- Participate in various activities and initiatives enumerated in the annexes such as coral farming, adoption of coral reef(s) and other related programmes.

KEY PERFORMANCE INDICATORS (KPI)

Strategic Goals/ Themes	Objectives	Measures/ KPI	Targets				
			2014	2015	2016	2017	2018
Increase Biodiversity and Areas	To preserve and protect coral reefs biodiversity and enhance reef health and ecosystem.	% Area of Live Coral	37.0	40.0	43.0	46.0	49.0
	To promote proper management of the reefs through the establishment of MPA and refugia..	% of MPA area	20	25	30	35	40
Increase the participation and awareness programme	To create awareness to the public and relevant stakeholders, the importance and role of coral reefs ecosystems.	Number of Campaign / Roadshow	2	5	5	5	5
	To Provide training for Reef Check, and Coral Propagation Programme	Number of Coral Propagation Students	10	20	30	40	50
		Number of Reef Check Students	15	30	30	45	45
Increase fish output	To conserve and protect our natural reefs generally to enhance food security and sustainable development of the fisheries that depends on it.	Value (\$ Million)	2.3	3.0	3.9	5.0	6.5

IMPLEMENTING PROCEDURES

Implementing procedures for activities and initiatives mentioned above are as described in the following annexes:-

- Annex 1: Implementation Procedures for Activities and Initiatives involving in Developing Coral Farming;
- Annex 2: Implementation Procedures for Activities and Initiatives involving in Adoption of Coral Reef(s); and
- Annex 3: Implementation Procedures for any other “Coral CARE Programme” Activities and Initiatives.



ANNEX 1

IMPLEMENTING PROCEDURES FOR ACTIVITIES AND INITIATIVES INVOLVING IN DEVELOPING CORAL FARMING

Acknowledgement / Recognition to the Participating Parties

1. Participating parties involved with coral propagation and replanting activities will be presented with a Certificate of Recognition as an acknowledgement for their involvement, participation and support towards this “Coral CARE Programme” campaign.

Site Demarcation

2. Sites selected for the coral propagation and replanting activities should be clearly marked.

Signage / Tagging

3. A signage / Tagging giving details of the planting activity should be erected on site. Details on the signage to include the following information:-
 - 3.1. Name of Organisation;
 - 3.2. Date of propagate;
 - 3.3. Family or Species of coral propagated;
 - 3.4. Area (km²);
 - 3.5. Site map; and
 - 3.6. GPS coordinate of the site.

Family or Species Selection

4. Priority should be given to propagate / planting of suitable indigenous/native coral family or species.

Seedling Maintenance

5. Participating parties are responsible for conducting regular checking and measure the growth of the coral every month of the newly propagate coral until they are mature and stable enough to grow on their own. This maintenance work will be carried out in consultation with the Department of Fisheries.

Supply of Seedlings

6. The Department of Fisheries will be responsible for the identification and checking of the damage coral to be propagated, while the participating parties (as part of the Organization's) will be responsible for conducting the propagating, planting and maintenance of the coral (including procurement of glue, coral growth catalyst and other relevant tools and equipment for the maintenance work).



ANNEX 2

IMPLEMENTING PROCEDURES FOR ACTIVITIES AND INITIATIVES INVOLVING IN ADOPTION OF CORAL REEF(S)

Acknowledgement / Recognition to the Participating Parties

1. Participating parties involved with the adoption of coral reef(s) will be presented with a Certificate of Recognition as an acknowledgement for their involvement, participation and supports towards this "Coral CARE Programme" campaign.

Location of the Adopted Coral Reef(s)

2. Location of the adopted coral reef(s) should be clearly marked with concrete base with stainless steel plate.

Signage

3. A signage giving details of the activity should be erected on site. Details on the signage to include the following information:-
 - 3.1. Name of Organisation;
 - 3.2. Date adopted;
 - 3.3. List of Family or Species of coral(s) found;
 - 3.4. Site map; and
 - 3.5. GPS coordinate of the coral reef(s).



Coral reefs tagging/marker

4. Coral reefs adopted should be individually tagged with concrete base with stainless steel plate by individuals or institutions (with name of organisation printed on the stainless steel plate) adopted by area (at least 5 sq meter).



ANNEX 3

IMPLEMENTING PROCEDURES FOR ANY OTHER “CORAL CARE PROGRAMME” ACTIVITIES AND INITIATIVES

Acknowledgement / Recognition to the Participating Parties

1. Participating parties involved with this “Coral CARE Programme” activity / initiative (apart from propagate and adopting coral reefs) should be presented with Certificate of Recognition as an acknowledgement for their involvement, participation and support towards this “Coral CARE Programme” campaign.

Site Demarcation

2. Sites selected for this “Coral CARE Programme” activity / initiative should be clearly marked and demarcated on the ground.

Signage

3. A proper signage giving details of the “Coral CARE Programme” activity implemented should be erected on site. Details on the signage to include the following information:-
 - 3.1. Name of Organisation;
 - 3.2. Title of project/activity;
 - 3.3. Date and duration of project/activity;
 - 3.4. Area (km²);
 - 3.5. Site map; and
 - 3.6. GPS coordinate.



**FOR FURTHER INFORMATION
PLEASE CONTACT:**

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